

P104 The impact of 3D modeling in surgical planning and outcomes of partial nephrectomy

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Introduction & Objectives: To evaluate the impact of three-dimensional (3D) digital reconstructions of renal models on surgical planning and surgical outcomes of patients scheduled for partial nephrectomy (PN) compared to conventional 2D imaging.

Materials & Methods: Overall, 195 patients with cT1-T2 renal cancer eligible for PN were prospectively enrolled. Each patient underwent chest and abdominal high-fidelity contrast enhanced computer tomography (CT) before surgery performed at single tertiary center. Population was stratified in two groups: study group (n=100 patients, 51%), in which a 3D renal model was obtained from CT images and reviewed by surgeons before surgery; control group (n=95 patients, 49%) in which only 2D imaging of CT scan was reviewed by surgeons before intervention. Outcome of interest were followings: rate of conversion to radical nephrectomy (RN), type of resection (standard resection vs. simple enucleation), intra and post-operative complications and achievement of trifecta (negative surgical margin, no complications and $\geq 90\%$ preservation of eGFR). Chi-squared, t-student and Mann-Whitney U-test were used to compare proportion, means and medians between the two groups, respectively.

Results: Overall, 144 (73.8%), 46 (23.6%) and 5 (2.6%) lesions were classified as clinical T1a, T1b and T2 tumour, respectively, with no difference between two groups. No differences were recorded in terms of age, ASA score, PADUA and RENAL score between the two groups (all $p > 0.05$). Overall, 20 patients (10.3%) underwent conversion to RN, with no significant difference between the two groups ($p=0.6$); however, 7 (77.8%) conversion to RN occurred in the study group were preoperatively planned based on 3D model evaluation and only 3 (27.3%) conversion to RN in the control group were preoperatively planned based on 2D imaging, with significantly higher rate of intraoperative conversion to RN ($p=0.03$). Considering 175 patients effectively underwent PN, 23 (25.6%) vs. 32 (28.1%) and 67 (74.4%) vs. 52 (61.9%) patients were treated with standard resection and simple enucleation in study and control group, respectively ($p=0.08$). Operative time, WIT, intraoperative blood loss and intraoperative complications were comparable between the two groups (all $p \geq 0.3$). Overall, 34 (19.4%) post-operative complications were recorded with no difference between study and control groups ($p=0.8$). Finally, trifecta was achieved in 58.2% of patients in study group and in 40.5% of patients in control group ($p=0.02$).

Conclusions: The adoption of 3D model for preoperative surgical planning of PN allows to reduce the rate of intraoperative not-planned conversion to RN due to better comprehension of tumor's anatomy compared to conventional 2D imaging. When PN is performed, the use of 3D model allows to achieve higher rate of trifecta, increasing the precision of surgery.